

Scissors, Stone and Paper

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(excerpted from his next book)

*To gain knowledge,
add something every day.*

*To gain wisdom,
get rid of something every day.*

- Lao Tzu

Remember playing "scissors, stone, and paper" as a kid? The name of this game reminds me of the structure of many schools: Scissors represent a curriculum cut into disconnected chunks. Stone represents the technology of the blackboard on which college-educated professionals write with another stone - chalk. And paper represents the continued dominance of the textbook.

Think about the traditional technologies of teaching - especially the blackboard and the textbook.



Teaching through the presentation of marks on walls goes back at least as far as the caves of Lascaux whose paintings date to about 15,000 BC.

While the scribal world was starting to have an impact on teaching in Europe by the fourteenth century, it was probably not until the mid-sixteenth century before students had access to the kinds of printed books found in our classrooms today.



And now we have the computer coming into our classrooms, and we ask what the effect has been.

In all to many cases, computers haven't had nearly the impact they could have. Millions of computers have made it into schools but many of them sit idle for much of the day, or they are used for reinforcement or reward - not as an integral part of the instructional program.

Happily, there are exceptions to this model. Some schools have done wonderful things with this technology, but computers haven't had nearly the impact on K-12 education they've had on business.

For example, a recent Nielsen survey conducted for CommerceNet showed that, in mid-1995, 8% of the population of the United States and Canada had accessed the world-wide web. Of those who did, 66% used the net from work, 44% used it from home, and only 8% gained access from school (including college). This is easy to understand once we see that very few schools have net access from the classroom.

Schools have been slow to adopt new technologies. Probably the only exception to this was the introduction of the electrostatic copier by Xerox. This tool was eagerly accepted by teachers because it made it easy for them to continue doing what they had been doing before - running off paper documents for student assignments.

Businesses, on the other hand, have generally been more adaptive to new technologies, although pockets of resistance emerge there as well. It took years for the fax machine to become commonplace, but once the technology started taking off, its adoption snowballed. The same thing happened when the word processor displaced the typewriter, and it is happening again in the world of digital data communications.

Why have schools been resistant to change? Money - or more accurately, the lack of it - has a role to play. But even in schools that have plenty of computers, these powerful tools are often not used to their full potential.

I've thought about this problem for years, trying to figure out how a tool that has become essential in the world of business information management has yet to make its mark in the most intensive information business in the world: education.

I think I have an answer - at least part of one.

In our race to bring new tools into the classroom, we forgot to think about what should be removed. Slate and textbooks are expected to co-exist with computers and multimedia.

Is it any wonder that, for many classrooms with computers, they are relegated to a back corner for use as "reinforcement" or "reward" rather than as an integral part of the students' learning experience?



Most (but not all) of the classrooms I visit every year look like updated versions of the classrooms of my youth. Yes, the slate is now green or white, instead of black, and the desks no longer have inkwells, but your grandparents could walk into most schools today and instantly recognize the classrooms. (My grandmother is in the last row, second from the left.)



Why does this matter?

Just because we've managed to eke some utility out of technologies dating back hundreds, if not thousands, of years doesn't mean we should continue down this path. The kinds of skills students need today are different from those they needed when preparing for the hunt in Cro-Magnon villages, and the perpetuation of the teaching technologies of that time seems to make little sense.

So, when we bring computers into the classrooms, imagine what would happen if we tore out the blackboards at the same time.

"What!? Remove my BLACKBOARD? Are you crazy?"

Perhaps - let's see.

Suppose, instead of a blackboard you had a large projection screen on which photographic quality color

images could be projected from television or computer-based information sources. In addition to rich images, you could display animation, films, hand-written notes - in short, a panoply of visual aids to education that go far beyond anything you could create on a blackboard.

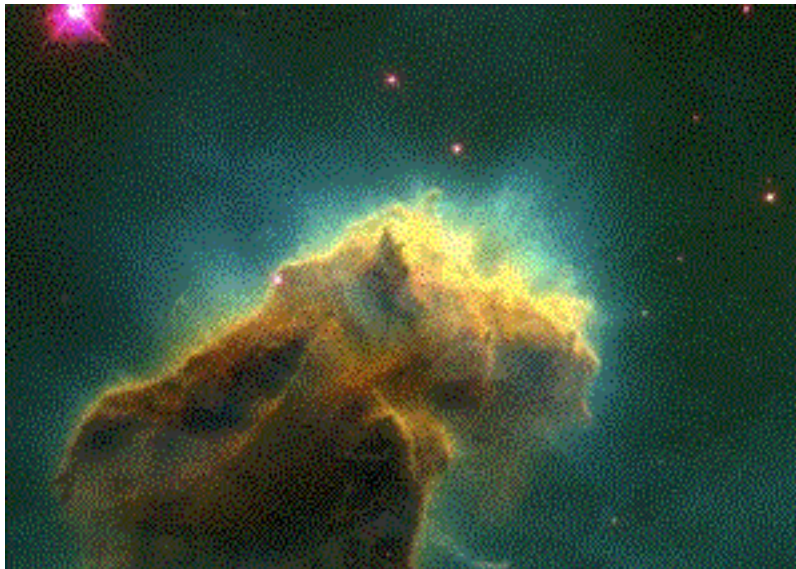
Furthermore, students could use the same system to share their multimedia work with their peers.

While the screen size might only occupy a portion of the wall, the rest of the blackboard space could be covered with cork board or some other material to which paper documents or student art could be attached.

Of course redesigning classrooms as though the technologies of this century were relevant to education would be expensive in the short term. But the price of not transforming our classrooms is too high to pay.

All too many students fall through the cracks of a traditional classroom. As Howard Gardner's research at Harvard shows, each of us has components of multiple intelligences through which we can learn just about anything. Traditional classrooms honor the linguistic and logical-mathematical learner, leaving the rest to count themselves among the worksheet-disabled.

Multimedia (especially when it is student generated) allows students to express what they know in ways that are natural to them.



In case you think I'm making too much out of this, consider an event that took place in the Fall of 1995 - beautiful color photographs from the Hubble Space Telescope showed a gas cloud in the Eagle nebula that is believed to be a birthplace for stars.

Pretend that you are the student. Which would capture your attention more, having a teacher tell you about the discovery with a few chalk marks on a blackboard to help describe the process, or seeing a wall-sized full-color image of the cloud downloaded from the [NASA photo archives](#) ?

Computers are outselling televisions in our country. According to the Nielsen study mentioned above, Americans, on the average, spend more time surfing the net than they do watching rented videotapes.

Rapid access to information by teachers and students alike can allow schools to explore topics in far greater depth than when teachers are limited to the power of a sheet of slate and a stick of chalk.

The cost of video projection equipment is dropping at the same time its quality is improving.

When liquid crystal display plates first came on the market, they projected monochrome images with very low contrast. They were subject to overheating from the overhead projector, and the projected image was quite dim. On top of these limitations, the response time of the display medium was so slow that moving images could not be displayed.

In contrast, today's active matrix color display plates are very bright, display millions of colors, and have response times fast enough to project videos. Furthermore, the price of these new displays is about the same or lower than the price we paid for the old technology.

By 1995, typical color display plates and high-brightness projectors allowed images and movies to be shown in classrooms without having to completely darken the room.

It would be patently unfair to just bring these technologies into classrooms and pull out the blackboards without providing ample opportunities for educators to learn how to use these new tools to transform their instructional strategies.

One of the major mistakes we've made in the past is to dump a load of technology on unsuspecting teachers and expect a miraculous transformation instantly.

I call this approach the "Music Man" effect. You may recall, in the musical, *The Music Man*, that the itinerant teacher/con artist planned to sell band equipment and uniforms to students without providing any musical training. While this made for an entertaining evening of theater, it makes for lousy pedagogy when we do the same thing to our educators.

This becomes all the more important when we look to the future of educational technology. Today's highest-tech classrooms typically have five or six computers for use by 30 students. In a few years, students will be bringing their own inexpensive computers to school - hand-held powerhouses with wireless net access built-in. The technologies needed to make this a reality are already in place. Imagine how silly classrooms would look if, at that time, they still were dominated by one person writing on a wall with a stick of chalk, or a colored marker!

How much does this all cost?

The power of the installed base is immense: Because our classrooms already have wall-sized writing surfaces in them, any incursion of new technology (and removal of the old) will cost money. Furthermore, it is likely to cost several thousand dollars per classroom to make the kinds of transformations I'm proposing here.

But, whatever the exact number turns out to be, it is sure to be less than the cost of failing to prepare our youth for their future - a future in which interactive educational tools the size of a wallet will allow us to connect to vast libraries of information anywhere on the planet.

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